

A COMPARATIVE STUDY OF CONVENTIONAL AND  
EXPANDABLE ACID RESISTANT STOPOUT  
MATERIALS FOR PRINTMAKING

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Master of Fine Arts

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by  
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## CHAPTER I

### INTRODUCTION

Experimentation has always played an important role in graphics, and in the past three decades, adventurous artists have tried virtually every conceivable material in making intaglio prints. As long as creative people handle tools and materials, unexpected things will happen. Artists will invent, not by intent, but by necessity.<sup>1</sup>

Since the time of the industrial revolution, printmakers have been deluged with a variety of "new materials" produced for the most part in accordance with the demands of the artists. These "new materials" were essentially variations on what was already in use and in some cases inferior in quality.<sup>2</sup> As the demand for improved materials grew, scientific advancement, coupled with the needs of the artist, led to improvement of old recipes and materials, especially stopout for intaglio printmaking.

The problem. In this study the problem projects the thesis that expandable acid-resistant materials (also

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<sup>1</sup>Labor Peterdi, Printmaking (New York: The Macmillan Company, 1965), p. xxi.

<sup>2</sup>Ralph Mayer, The Artist's Handbook of Materials and Techniques (New York: The Viking Press, 1947), pp. 22-32.

referred to in this thesis as non-conventional materials) offer definite advantages to the printmaker when working with intaglio processes. This report provides a comparative study of the characteristics of expandable acid-resistant materials and those of the conventional materials.

The conventional products used were spirit varnish, lift-ground solutions, and rosin. There are two types of spirit varnish: liquid rosin and shellac. Both will be discussed in Chapter II, paragraph 2.

Definitions of terms used. For purposes of clarity, the following definitions of terms used in this creative report are furnished:

Lift-ground. Lift-ground is a substance applied to the plate and the ground is laid over the substance which lifts the ground off the plate exposing that part to the biting action of the acid.<sup>1</sup>

Ground. Ground is an acid-resistant, thin coating of beeswax, resin, and asphaltum rolled or dabbed on a metal plate. The design or image is scratched through the ground.

Rosin. Rosin is a product used to obtain dark and light tonal areas.

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<sup>1</sup> Julius Singer, Fundamentals of Paint, Varnish, and Lacquer Technology (St. Louis: The American Paint Journal Company, 1957), p. 5.

Stopout. Stopout is a substance that prevents certain etched lines within the ground from being bitten by the acid.

Though satisfactory, the conventional methods had some disadvantages. These disadvantages are discussed in the later chapter on conventional methods. Methods that employed both traditional and expandable acid-resistant materials will be discussed in later chapters.

In this comparative study, the writer tried to overcome the limitations of the traditional materials by experimenting with expandable acid-resistant products. The non-conventional materials used were polyvinyl (lift-ground), spray gum rubber (aquatint), and workable fixative (aquatint, hard and soft-ground). Although, technically speaking, polyvinyl was not used as a stopout in the lift-ground process, it was incorporated in this discussion because of its specific importance to the lift-ground process, and to printmaking in general.

These expandable products all have two common bases: Latex and/or resin. There are two types of Latex: natural and synthetic. Natural Latex is a liquid, contained in the bark of *Hevea brasiliensis* trees, which exudes when the bark is cut. As it is collected, the Latex contains about 30



per cent of resins, proteins, and ash, and the remainder being water. The use of synthetic Latex has increased tremendously in the past two decades.<sup>1</sup>

There are three types of synthetic Latex: polystyrene-butadiene emulsion, polyvinyl acetate emulsion, and acrylic emulsion.<sup>2</sup>

Polystyrene-butadiene emulsion is the basis for the water thinnable latex emulsion paints that are now being sold and used in enormous quantities. Polystyrene is a hard, colorless, brittle resin that is tack free at room temperatures. Polyvinyl acetate emulsion consists of water, surface active agent, protective colloid, and catalyst. The polyvinyl acetate is, by itself, too brittle to be used as is. Plasticizing materials of one type or another must therefore be added to give it the necessary degree of flexibility. Acrylic emulsions depend to a large degree on the type of alcohol (either ethyl or methyl) from which the acrylate or methacrylate ester is prepared. Resin is a solid or semi-solid amorphous fusible natural organic substance that is translucent and yellowish to black in color. It is, like latex, formed from plant secretions and is soluble in either butyl (a strong form of alcohol) or denatured alcohol.<sup>3</sup>

There are various kinds of synthetic resins, the most outstanding being Polyvinyl Chloride paints, varnishes (shellac and liquid rosin) and adhesives (spray gum rubber). It is used in chlorostannic acid and chlorostannous acid on rubber.<sup>4</sup>

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<sup>1</sup>Ibid., pp. 246-247.

<sup>2</sup>Ibid.

<sup>3</sup>Ibid.

<sup>4</sup>Dean H. Parker, Principles of Surface Coating Technology (New York: Interstate Publisher, a Division of John Wiley and Sons, 1958), p. 304.

Expandable acid-resistant materials and the conventional materials were alike in one important respect--their transparency, which allows the artist visual contact with his plate.

Procedure. Because of the limited number of books written on both the conventional and non-conventional methods, the writer obtained most of his information through personal experimentation with the media. In addition, letters were written to three well-known printmakers asking for information on expandable acid-resistant materials in regard to the intaglio processes. These letters were sent to the following: Gabor Peterdi (assistant professor of Art at Hunter College, New York); Jules Heller (University of Southern California); and Mauricio Lasanaky (University of Iowa). The writer found that these people had not used non-conventional materials for printmaking.

Test plates were used to determine various properties of both the conventional and expandable acid-resistant materials under the conditions of a number of different intaglio processes: aquatint, hard-ground (etching), soft-ground (texture), and lift-ground. From this testing, the writer eliminated many of the mechanical problems of the esthetic and conceptual problems and to utilize the inherent characteristics of a flexible medium.

The test plates resulting from these experiments indicated the advantages of expandable acid-resistant materials over conventional materials. The most significant of these advantages was being able to correct stopout mistakes without regrounding the plate. The newly-discovered method of correcting stopout errors and its advantages to the artist are discussed in Chapter III, Section One.

## CHAPTER II

### THE CONVENTIONAL METHOD OF STOPPING OUT

The tests that are discussed in this chapter were chosen to establish a criterion by which the characteristics of conventional stopouts could be measured and compared to those of expandable acid resistant materials.

There were two conventional stopouts considered: (1) spirit varnish, and (2) asphaltum. There are two types of spirit varnish. The first is a combination of rosin dissolved in denatured alcohol. The second is shellac, a substance derived through a process of heating and filtering, which is also dissolved in denatured alcohol. Asphaltum varnish, also known as Egyptian asphaltum of Gilsinite, produces a black opaque varnish when dissolved in gum turpentine. Benzol may be used in place of turpentine to produce faster drying. Asphaltum varnish is very tough and is generally used to coat the back of plates.<sup>1</sup>

The consistency or formula of both conventional stopouts varied according to individual working methods. Peterdi

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<sup>1</sup>Gabor Peterdi, Printmaking Today (New York: Holt, Rinehart and Winston, 1958), pp. 98-99.

maintained that, "too thick a varnish is difficult to brush on freely, and varnish that is too thin will have a tendency to run and spread on the plate. Stopping out varnish must be applied very methodically. Careless work can ruin the plate or cost many hours of correction."<sup>1</sup> If the desired area is stopped out accidentally, the artist must reground the plate and re-etch the area.

# I. CONVENTIONAL USES OF SHELLAC STOPOUT WITH HARD AND SOFT-GROUND

The writer limited himself to two plates which show the two intaglio processes, hard and soft-ground. The line-work in each plate was achieved by hard-ground etching. Senefelder's hard ground was applied to both plates. It consisted of:

twelve parts wax  
six parts mastic  
four parts asphalt  
two parts resin  
one part tallow.<sup>2</sup>

The ingredients are mixed at low heat and without Benzol. Asphaltum is added to the wax and the resin is mixed in last. When the ingredients have melted, the ground is strained through several layers of cheesecloth into a pan of cold water. As the ground

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<sup>1</sup>Ibid., p. 96.

<sup>2</sup>Jules Heller, Printmaking Today (New York: Holt, Rinehart and Winston, 1958), p. 247.

cools, it can be rolled into a ball which may then be wrapped individually in pieces of silk or fine linen to keep them clean and easy to handle.<sup>1</sup>

Both plates were also coated with a soft-ground consisting of: two parts liquid hard-ground, and one part tallow, axle grease, or vaseline. For a softer ground, more grease was added to the above recipe. When a firmer ground was desired, more asphalt was added. For sake of clarity liquid hard ground is prepared at high heat and Benzol is added until the mixture reaches a thin consistency and flows easily.

Before applying hard-ground, the plate was cleaned with Comet, a common household cleanser (Proctor and Gamble, Cincinnati, Ohio), to rid it of all oil and grease, which tend to break down the ground under the biting action of the acid. After being dried thoroughly, the plate was heated and the hard ground was applied. If too thick, hard-ground would become brittle and chip off as the etching needle, or any sharp instrument, was drawn across it. If coated too thinly, the ground would not hold up under the action of the acid.

The etching needle (or any sharp-pointed instrument) is used to expose the plate to the acids. It was important

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<sup>1</sup>Ibid., p. 77.

to use sufficient pressure on the needle to remove all the ground from the plate, thus insuring an even bite.

After the needled line drawing was etched into the plate, certain areas were stopped out to prevent further biting by the acid. This stopping-out was done by the conventional method using shellac. If the shellac was too thin, it was hard to control, and if too thick, it was difficult to apply. It was thinned by adding a small amount of denatured alcohol.

Advantages of using shellac were:

1. Shellac was relatively inexpensive, and
2. It applied and adhered well to hard-ground, as well as to soft-ground, aquatint, and lift-ground.

Figures 14 and 16 show some of the possibilities of hard-ground etching, such as a variety of cross-hatching and line variation.

The disadvantages of using shellac were the same as for aquatint, hard and soft-ground. Once applied, it could not be removed without damaging the ground under it. Also, the shellac had a tendency to break down under the action of the acid if too thinly applied on certain areas as shown in Figure 2.

To apply soft ground, the plate does not have to be so meticulously cleaned as for hard-ground or aquatint,

because soft-ground already contains grease. The plate should not be coated too heavily, or the ground will not be sufficiently sensitive to impressions.

Today, soft-ground is exploited in many ways. The contemporary artist is interested in the sensitivity of soft ground which will register anything from the delicate texture of a thumbprint to the coarse texture of burlap.<sup>1</sup> The variety of textures obtainable from the soft-ground process is practically infinite. By successive bites one can build up rich tonal and/or textural areas. The writer used two plates to show these rich tonal characteristics. See Figures 1 and 15.

The procedure for imprinting texture into soft-ground was as follows:

1. The plate and material were covered with wax paper so the soft-ground would not be pushed through the raised material onto the felt covering the plate.
2. The plate was then run through the press.

A controlled design was achieved by the stop-out method, rather than to cut textured material to fit the

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<sup>1</sup>Peterdi, op. cit., p. 101.





Figure 1. Print containing hard and soft-ground etching, aquatint, copper, size 8" x 11-1/2".

image exactly. When the plate was run through the press it was almost impossible to avoid offsetting the ground onto the paper, thus exposing the plate. Unless these exposed areas were adequately covered, the plate would have many foul bites (accidental dots or irregular areas bitten into a plate). This is shown in Figure 2.

## II. CONVENTIONAL USE OF SHELLAC

### STOPOUT WITH AQUATINT

Rosin, a translucent, acid-resistant, solid material, can be used as an aquatint when it is crushed into fine particles, dusted on a plate in the right proportions, and fused to the metal surface by heating. It was used to etch contrasting tonal areas on the plate controlled by the amount of rosin and the time allowed for etching. This can be seen in Figure 3. The acid bit tiny crevices into the metal around the particles of rosin that are attached to the plate. The crevices held ink and printed as a tone. The values (relative lightness or darkness) and the textures (structural quality of the surface) were determined by the density, width and depth of these crevices. The writer used both copper and zinc plates. The zinc plate was bitten in a nitric acid solution consisting of: one part nitric acid, and three parts water. The copper plates were bitten in Dutch Mordant

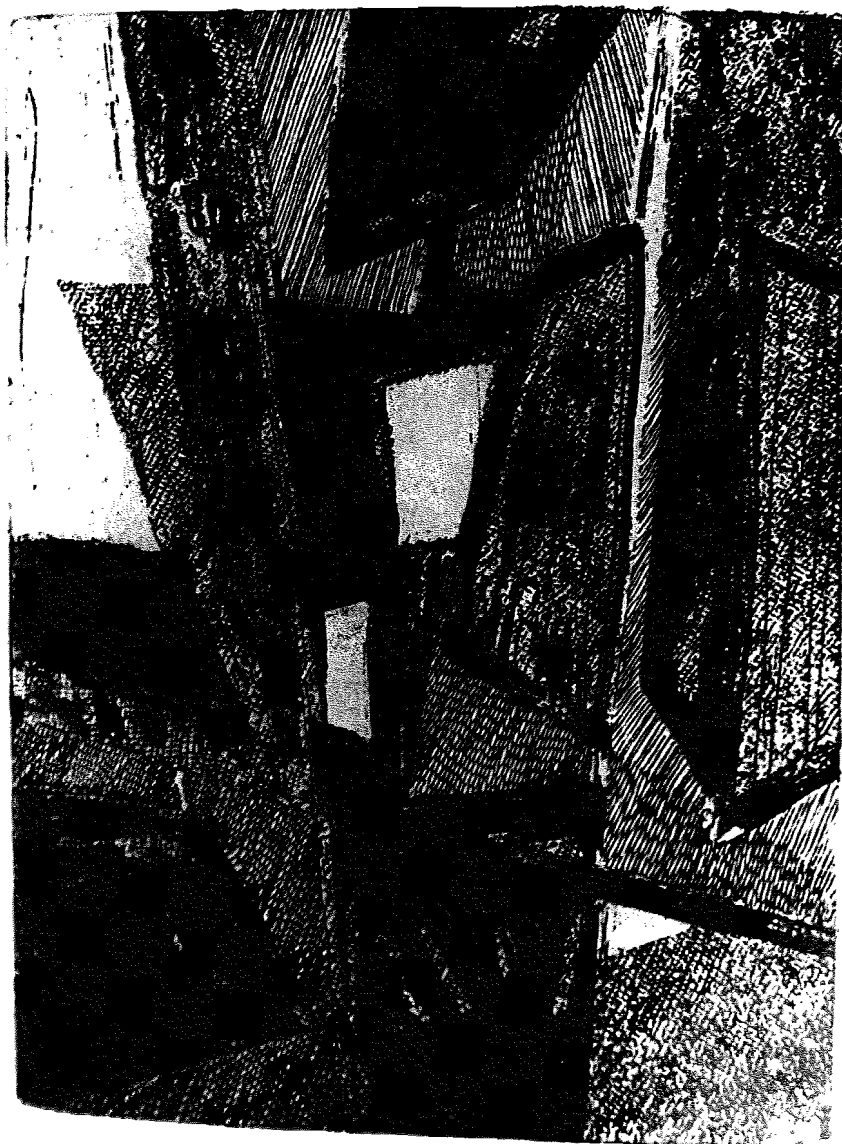


Figure 2. Area indicating shellac breakdown, containing hard and soft-ground etching, aquatint, zinc, size 8" x 6".



Figure 3. Aquatint, hard and soft-ground etching on copper, size 8" x 12".

consisting of: two parts potassium chlorate, ten parts hydrochloric acid, and eighty-eight parts water.

Aquatint provides greater visual effectiveness when used with simplicity and directness, as shown in Figure 16.

The writer used two methods of applying rosin to the metal plate. A dust box was the first method used. "The box is equipped with a rosin tray and a sliding tray to hold the plate. The box is shaken to distribute the rosin and the plate is inserted into the box for several seconds (determined by desired density of rosin on the plate)."<sup>1</sup> Another form of dust box is a stationary model equipped with an air compressor. The air pressure created distributes the rosin. This type does not limit the size of the box and thus allows larger plates. The second method employed was a dusting bag. The bag, made of cheesecloth, allows the rosin to filter through onto the plate. There are two distinct advantages to the dusting bag. The first advantage is that it does not limit the size of the plate. Many contemporary artists, including Gabor Peterdi, Mauricio Lasansky, and Karl Schrag use enormous plates and manipulation of a box would be most impractical. "The second advantage is that it offers much

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<sup>1</sup>Ibid., pp. 111-112.

greater flexibility and control because one can vary the density and texture in any particular area of the plate at will."<sup>1</sup>

After the rosin was applied to the plate, the plate was observed at eye level to determine the amount of rosin on the plate. Due to reflection of the light, the rosin could be observed more easily from eye level than from looking down on it. When the consistency of rosin appeared correct (a 50 per cent covering), the plate was then placed on a heating unit. As the plate warmed up, the rosin melted, became transparent and fused to the plate. This is the normal occurrence. When the plate surface did not show any opaque particles of rosin dust, the fusing was completed, and the plate was then ready to be immersed into acid after the desired areas were stopped-out. Stopping-out is a process that prevents certain lines or areas on a plate from biting by brushing on an acid proof material. It requires consideration and care, especially if the aquatint is applied to a plate on which much of the imagery is already completed. Stop-out also is used to protect the back and edges of a plate while it is in the acid.

The functions of using shellac as a stopout were:

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<sup>1</sup>Ibid.

1. Shellac was used to cover scratches or faults in the aquatint.
2. A variety of controlled values was produced on a plate consisting of aquatint by biting the plates in acid and subsequently stopping-out in different stages.

This is shown in Figure 15. The transparency of the stopout shellac was very important when comparative tonal values in the previously bitten aquatint were to be observed. An experienced etcher develops an "eye" to see the tonal values, but Peterdi found that by adding a methyl violet dye, it was easier to observe the stopped-out areas in aquatint, hard and soft-ground.

The disadvantage of using shellac was that the writer was unable to change the results without tediously cleaning the plate and applying new aquatint.

### III. CONVENTIONAL MATERIALS FOR LIFT-GROUND

Two basic procedures, both requiring the use of aquatint, were used to execute the lift-ground process. The first procedure was to apply the aquatint to the plate and then to draw with a lift-ground solution. (Three liquid solutions can be used for lift-grounds: (1) a mixture of 50 per cent tempera or poster paint and 50 per cent gum arabic,

(2) a saturated mixture of 50 per cent sugar and 50 per cent India ink, or (3) a mixture of 50 per cent liquid soap and 50 per cent India ink.) After the solution dried, Universal Etching Ground was applied. This ground consisted of: two parts Egyptian asphaltum, two parts Beeswax (white or yellow), and one part rosin.<sup>1</sup> (Through years of experimenting with different stopouts, the writer found that Universal Etching Ground was acceptable to the lift-ground process because of the exceptional adhesion qualities necessary to withstand the many procedures in the lift-ground process. Universal Etching Ground also had less tendency to break down under the biting action of the acid.) The plate was then submerged in water and the treated area rubbed to start lifting action of the lift-ground. If an aquatint has previously been applied, excessive rubbing should be avoided, because such rubbing or friction may injure the aquatint. The dissolving of the sugar or poster paint, depending upon which solution is used, causes the lifting action to begin. As the lifting action occurs, the aquatint is exposed, and the plate emerged in acid.

The second procedure was to make the lift-ground first and then to apply the aquatint after the lift-ground was washed off the plate. The results of the two procedures were virtually identical as shown in Figures 4 and 13.

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<sup>1</sup>Ibid., pp. 98-99.





Figure 4. Print Containing Lift-ground, aquatint, hard-ground etching, copper, size 4" x 6".

For the preceding procedures, the plate was prepared by cleaning it thoroughly, thus insuring a grease-free plate, so it would better attract lift-ground and provide a more tenacious bond with the metal surface. It was found that by placing the plate in acid for a few seconds, allowed the plate to bite, and thereby provided tooth (a rough surface) to give better adhesion to the lift-ground.

After the images were drawn onto the plate with the lift-ground solution, it was dried thoroughly before proceeding. When the lift-ground was dry, the Universal Etching Ground was brushed on thinly and evenly to insure a faster penetration of the Universal Etching Ground and subsequently a more rapid dissolving of the lift-ground. Once the Universal Etching Ground had dried, the plate was placed under warm water. The water, combined with a slight rubbing action with the hand, removed the lift-ground and exposed the plate.

### CHAPTER III

#### NON-CONVENTIONAL METHODS OF USING EXPANDABLE ACID-RESISTANT STOPOUT MATERIALS

To establish a basis for the comparative study, the writer experimented with a wide variety of expandable acid-resistant materials. The products tested were: Rubber Cement, Wyplar (gesso), Myston (spray fixative), Tuffilm (spray fixative), Wyplar Gloss (medium and varnish), Maskoid (photo liquid frisket), Hair spray, Elmers glue, Spra-shield (liquid masking tape), Spra-ment Adhesive (spray rubber cement), Krylon (workable fixative) and Spray paint.

Of these materials, only a few proved applicable and, in some instances, highly valuable to the intaglio processes. These products (by their brand names) were: Spra-shield, Spra-ment adhesive and Krylon, (hereafter referred to as): polyvinyl, spray gum rubber, and workable fixative, respectively. Polyvinyl contains polyvinyl chloride resin. The principal use of polyvinyl chloride homopolymers is in calender coatings, or anosols, plastisols, and lattices, which usually require plasticization to produce practical surface coatings. The previous information was obtained through correspondence with the Ramcell Manufacturing Company, 1642 Fairlawn Avenue, Palo Alto, California, and from

Iowa Paint Manufacturing Company, Des Moines, Iowa. The composition for spray gum rubber is a solution of natural gum rubber dissolved in petroleum propane, a vegetable compound. This information was obtained from the 3M Company, Minneapolis, Minnesota. Workable fixative contains plasticized nitrocellulose, a water insoluble resin. It is low in solids.

The writer felt that before a final thesis print, using expandable materials, could be created, he must, through a series of tests, explore the mechanical benefits and visual characteristics that these products lend to the medium. Both zinc and copper plates were used, and it was found that expandable acid-resistant materials worked equally well on both metals. Nitric acid was used to bite the zinc plates; Dutch Mordant was used to bite the copper plates. Each mordant was mixed fresh to alleviate any possibility of "bad" acid. Both the copper and zinc were purchased new to eliminate any problem of pitted metal plates. The expandable materials were found to be acid-resistant and completely compatible with the intaglio process. Further experimentation explored the different textural and visual possibilities through the controlled use of each product.

# I. NON-CONVENTIONAL STOPOUT WITH HARD AND SOFT-GROUND

The writer conducted simulated tests using workable fixative on Senefelder's hard (ball) etching ground and soft-ground to learn:

1. If workable fixative was compatible with hard and soft-ground,
2. If workable fixative was acid-resistant,
3. If workable fixative would be lifted from the ground to correct stopout errors.

In the first test, one-half of a plate was coated with hard-ground and the other half with soft-ground. Fixative was then applied by brush over the entire plate. Prolonged brushing with excessive pressure should be avoided, since this could cause damage to ground. The fixative proved compatible with both the hard and soft-ground, because it did not remove any portion of either.

In the second test, the same plate was submerged in acid. The acid did not bite through the workable fixative, thus proving the fixative to be acid-resistant.

The third test, which used the same plate as tests one and two, ultimately proved to be the most significant of all the thesis experiments.

The writer, in attempting to find a method of lifting the already applied workable fixative without damage to the ground, discovered that a common, readily available artist's material--masking tape--not only worked, but provided a number of added benefits to the printmaker. The writer used a small piece of masking tape, pressing it firmly over the stopout error. The tape adhered to the fixative but not to the ground. Due to the wax in the ground this enabled him to remove the fixative, and thus correct his mistake. In the past, to make the same correction with shellac, it would have been necessary to remove the stopped-out area with denatured alcohol. This would generally cause a breakdown of the ground, thus exposing the plate in corrected area, and causing the artist to sacrifice certain elements of his intended image. However, the writer also tested the lifting of shellac with masking tape as he had previously done with workable fixative and discovered the same results could be achieved in either case.

This method of correcting stopout mistakes offers many advantages to the artist. First, the time spent on correcting these errors is but a fraction of what it would be using conventional procedures. Secondly, it eliminates any possibility of total loss of the artist's plate. And

finally, it provides the artist with greater psychological freedom by dispelling any fear of making stopout errors. Examples showing hard and soft-ground etching with both shellac and workable fixative are shown in Figures 18 and 20.

## II. NON-CONVENTIONAL MATERIALS FOR AQUATINT

The artist used both spray gum rubber and workable fixative for the aquatint. Spray gum rubber will be discussed first. Four by five-inch test plates of both copper and zinc were prepared by cleaning and drying over heat. The plates were laid on a clean surface before applying spray gum rubber. Spray gum rubber proved to be most effective in producing a fine aquatint because it immediately sets up on contact with the plate, thus preventing any running action. Application was made by holding the can ten to twelve inches from the plate. Applying an even aquatint was accomplished simply by moving the spray the entire distance across the plate, then proceeding on past until spray did not come into contact with the plate.

The biting time for the copper plates with a deep black, was forty-five minutes as shown in Figures 5 and 6. Although freshly mixed acid was used the strength of the acid was a factor in the biting time and therefore had to be constantly checked. For example, if the strength of the acid is weak (due to temperature, atmosphere, or age of acid), biting

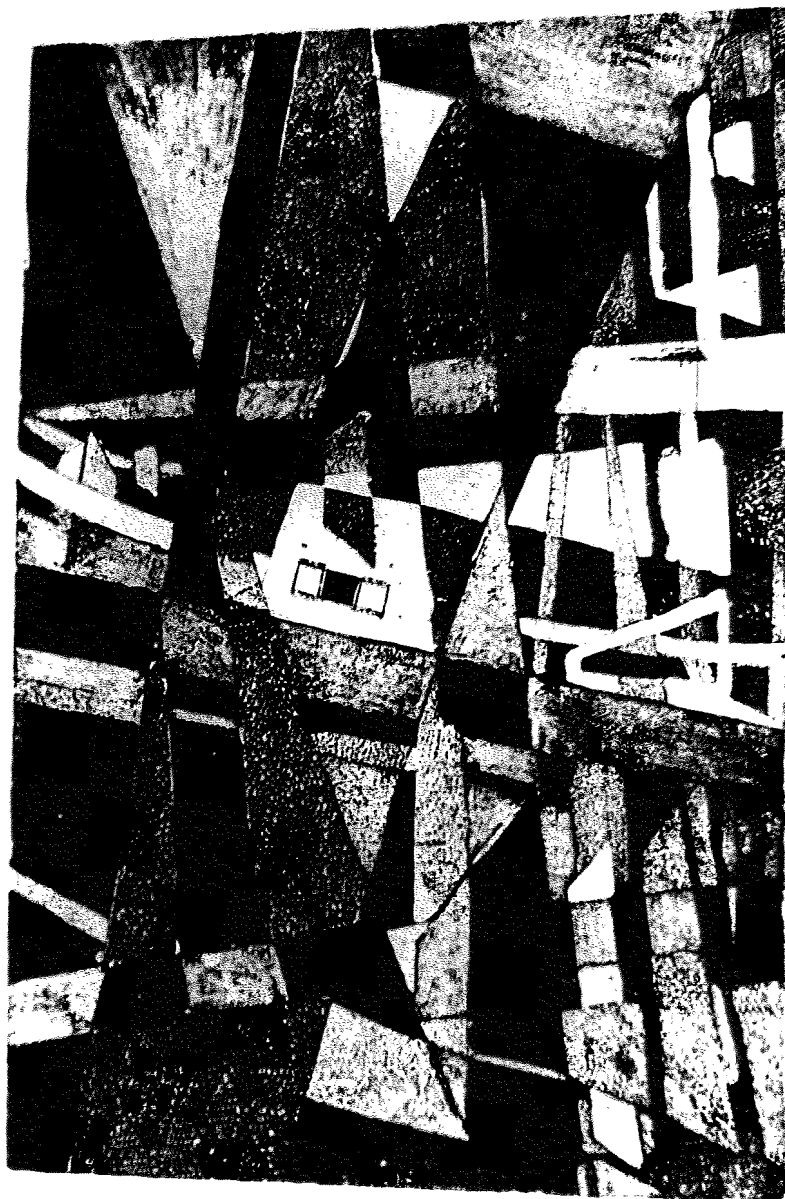


Figure 5. Print containing hard and soft-ground etching, aquatint, copper, size 8" x 12".



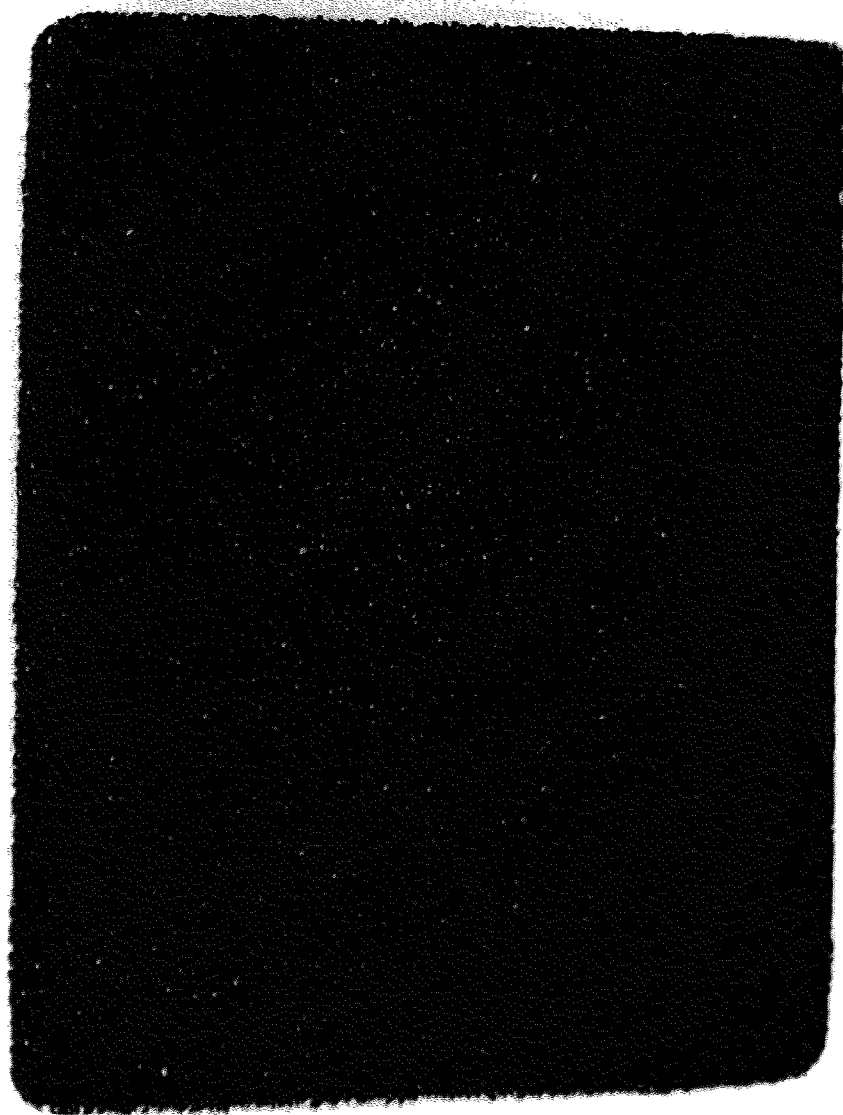


Figure 6. Print containing aquatint, copper,  
size 4" x 5".

time will be substantially longer.

It has already been stated that spray gum rubber proved most effective in producing a fine aquatint. If a coarse texture aquatint is desired, workable fixative is superior to spray gum because its more fluid composition causes it to spread out on the surface of the plate. The fixative is applied to both copper and zinc plates, in the same manner as the spray gum, and the end results are shown in Figures 7, 8, 9, and 10.

The advantages of using spray gum rubber or workable fixative for aquatint, instead of the conventional powdered rosin, were as follows:

1. Spray gum rubber or workable fixative was faster.
2. There was less chance of error through excessive handling or insufficient control of amount applied.

### III. NON-CONVENTIONAL MATERIALS WITH LIFT-GROUND

The writer, using the sugar and ink solution, mixed the desired lift-ground, and applied it to the plate. After the solution was dried, Universal Etching Ground was applied by brush. When this was dry, the plate was held under warm water. The action of the running water caused the ground to dissolve and lift, thus exposing the plate.

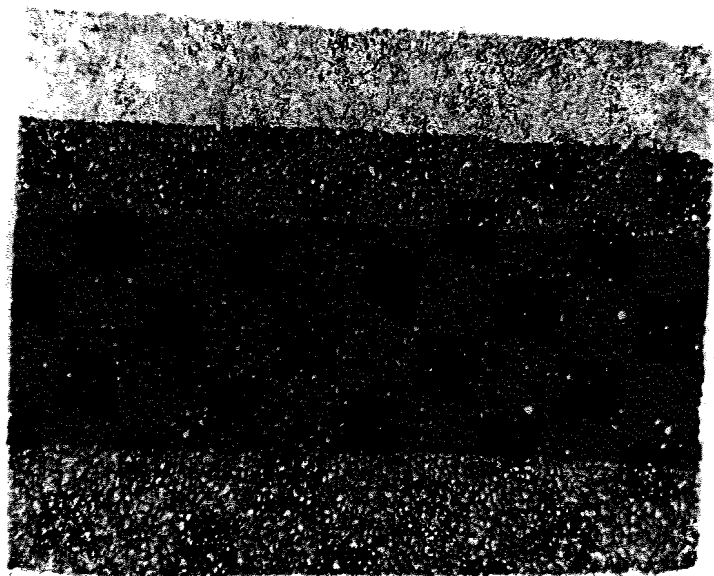
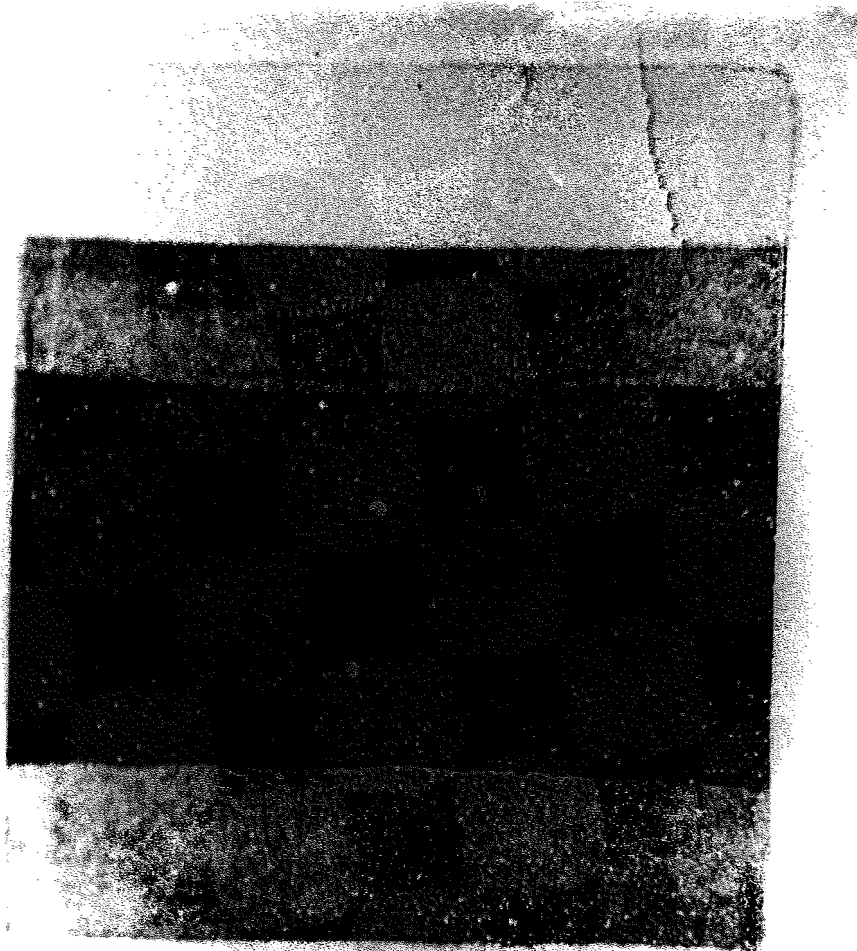


Figure 7. Print containing aquatint, zinc, size 4" x 5".



x 5". Figure 8. Print containing aquatint, copper, size 4"



Figure 9. Print containing aquatint, hard-ground etching, copper, size 4" x 5".

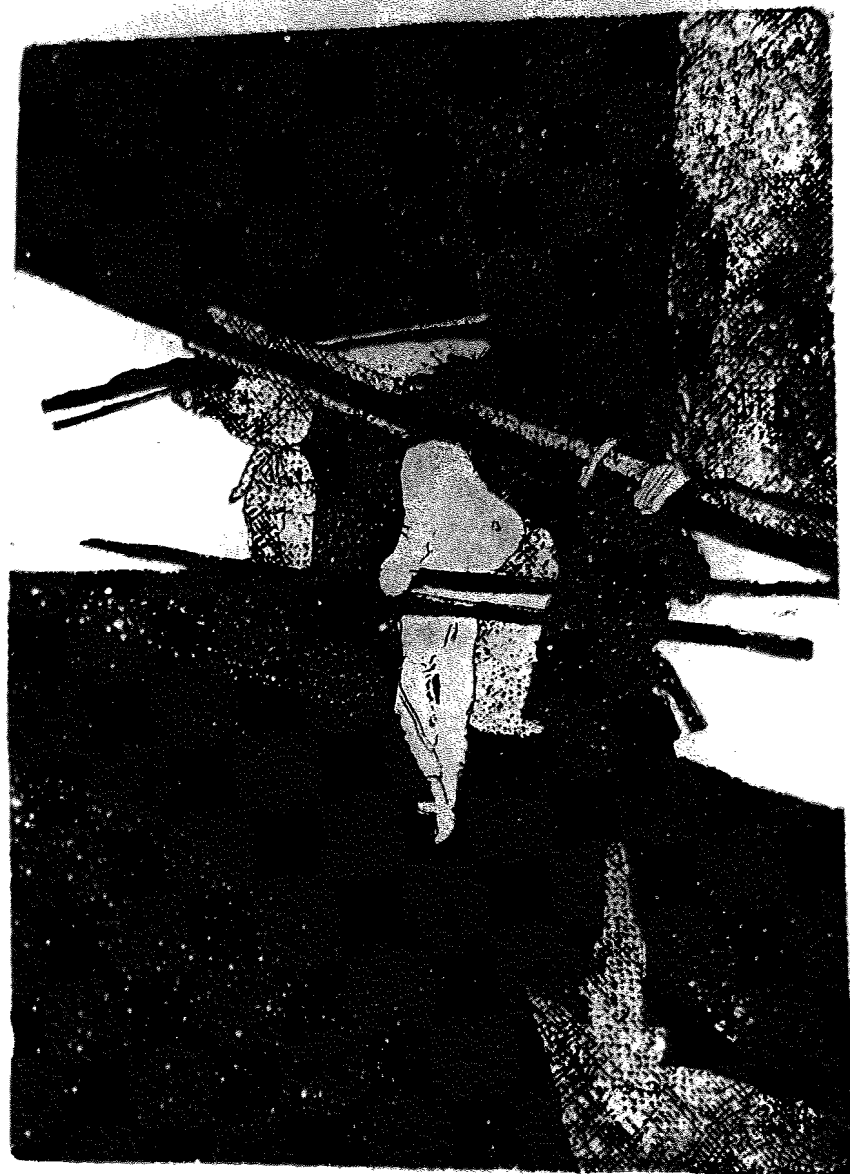


Figure 10. Print containing aquatint, hard and soft-ground etching, copper, size 6" x 8".

The writer then tested an expandable material, polyvinyl, as a substitute for the conventional lift-ground solutions, to compare effectiveness. The experimental process was as follows: the plate was washed clean; polyvinyl was brushed on the areas to be lifted; and Universal Etching Ground was applied evenly and thinly over the lift-ground (polyvinyl). This was done to insure easy detection on the polyvinyl under the Universal Etching Ground.

After the Universal Etching Ground was thoroughly dry, masking tape was again tested for its applicability to the lifting process. The masking tape was laid over the lift-ground (polyvinyl) area, pressed down firmly, and then removed.

Because the polyvinyl does not adhere as firmly to the plate as the Universal Etching Ground, only those areas with polyvinyl were removed. Aquatint was then applied using spray gum rubber and workable fixative, as described in Chapter III, Part Two. The plate was then ready to bite. Examples are shown in Figures 11, 12, and 18.

From this test, distinct advantages of using polyvinyl as a replacement for conventional lift-ground solutions were noted. First, and most important to the artist, is the time element. The amount of time required to brush on the polyvinyl is considerably less than the time used in mixing and applying the conventional lift-ground solutions.



Figure 11. Print containing lift-ground, aquatint, copper (spray gum rubber), size 4" x 6".





Figure 12. Print containing lift-ground, aquatint, zinc, (workable fixative), size 4" x 5".

A second advantage is the accuracy and sharpness of the edge left when the lift-ground is removed. Finally, the removal of the polyvinyl requires no rubbing, and therefore eliminates any possibility of covering the exposed surface with ground as sometimes occurs with conventional lift-grounds.

## CHAPTER IV

### CREATIVE APPLICATION OF FINDINGS

To apply the findings of the foregoing tests, the writer prepared six preliminary prints and two final thesis prints. Three of the preliminary prints were made using conventional materials, and the other three using non-conventional materials. One final thesis print was made for each of the two processes. These prints provide an excellent visual understanding of the characteristics and differences between the conventional and non-conventional materials.

In making the six preliminary plates and the two final thesis prints, the writer used three copper preliminary plates, and one zinc final plate with the conventional methods, and two copper, and one zinc preliminary plates, and one zinc final plate with non-conventional materials. The zinc plates were bitten in nitric acid and the copper plates in hydrochloric (dutch mordant). Combinations of hard-ground, soft-ground (texture), aquatint and lift-ground were used for each of the plates and are so specified under each print (Figures 13 to 20).



Figure 13. "Dad" containing lift-ground, aquatint, hard-ground etching, copper, size 13-1/2" x 16".



Figure 13-A. Area enlargement of Figure 13, "Dad" containing lift-ground, aquatint, hard-ground etching, copper, size 13-1/2" x 16".



Figure 14. "Cross-section of Nature" containing hard-ground, etching, copper, size 8" x 11".

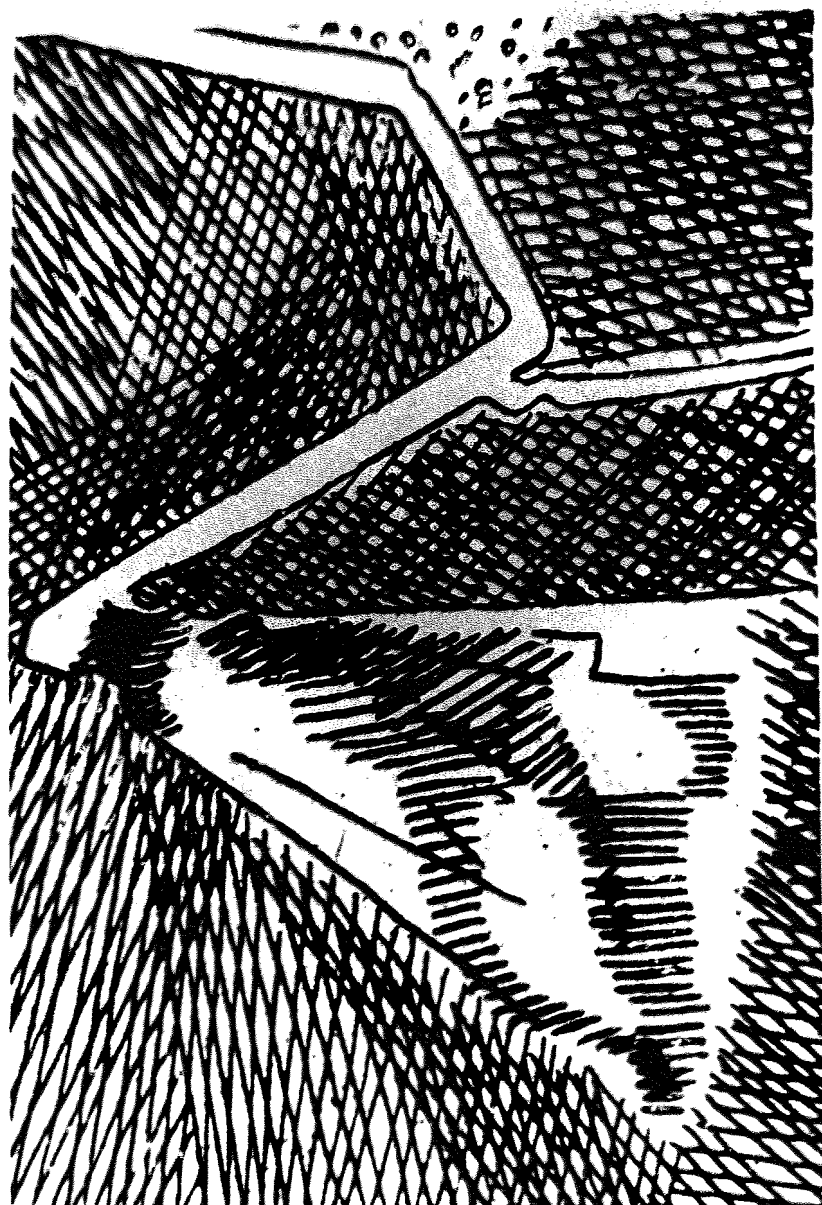


Figure 14A. Area enlargement of Figure 14, "Cross-section of Nature" containing hard-ground etching, copper, size 8" x 11".



Figure 15. "Share-croppers" containing hard and soft-ground, aquatint, copper, size 10-1/2" x 19".





Figure 16. "Human Larva," final thesis print using conventional materials containing lift-ground aquatint, hard and soft-ground etching, zinc, size 17" x 22".

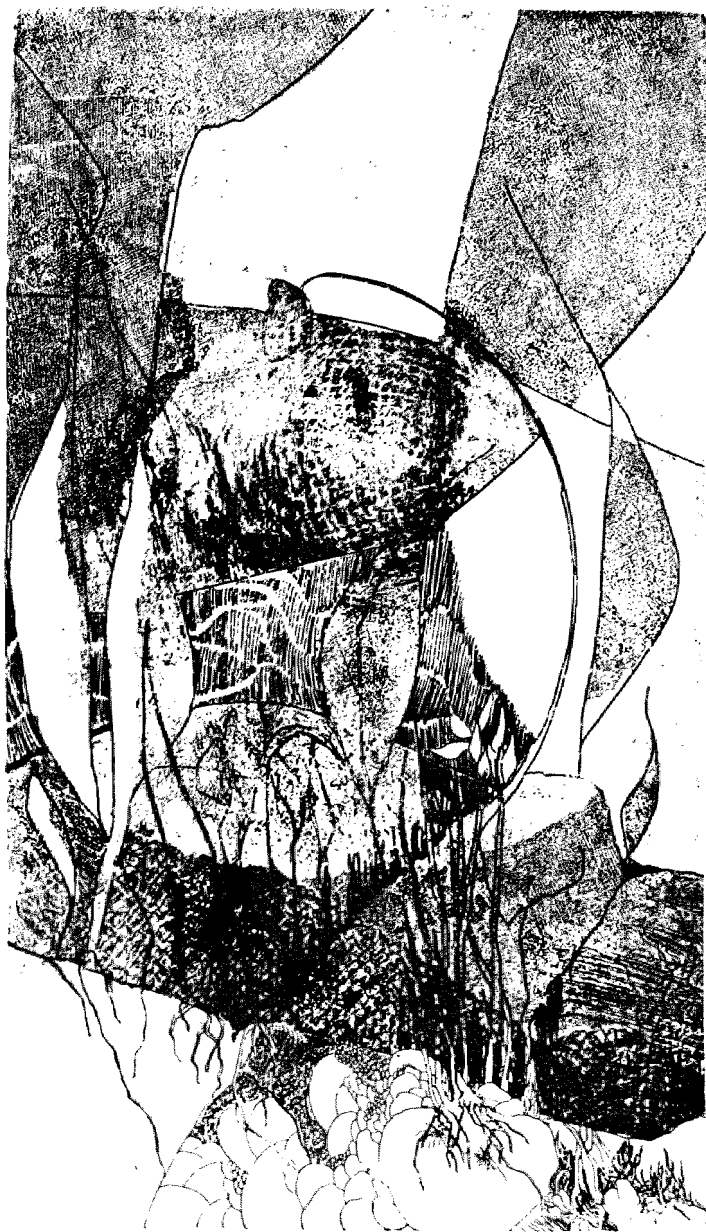


Figure 17. "Seeding" containing aquatint, lift-ground, hard and soft-ground etching, copper, size 7" x 12".



Figure 18. "Black Elegance," containing lift-ground aquatint, soft-ground etching, copper, size 8" x 18".



Figure 18-A. Area enlargement of Figure 18, "Black Elegance" containing lift-ground aquatint, soft-ground etching, copper, size 8" x 18".



Figure 19. "Confinement" containing aquatint, hard and soft-grounds, zinc, size 12" x 16".

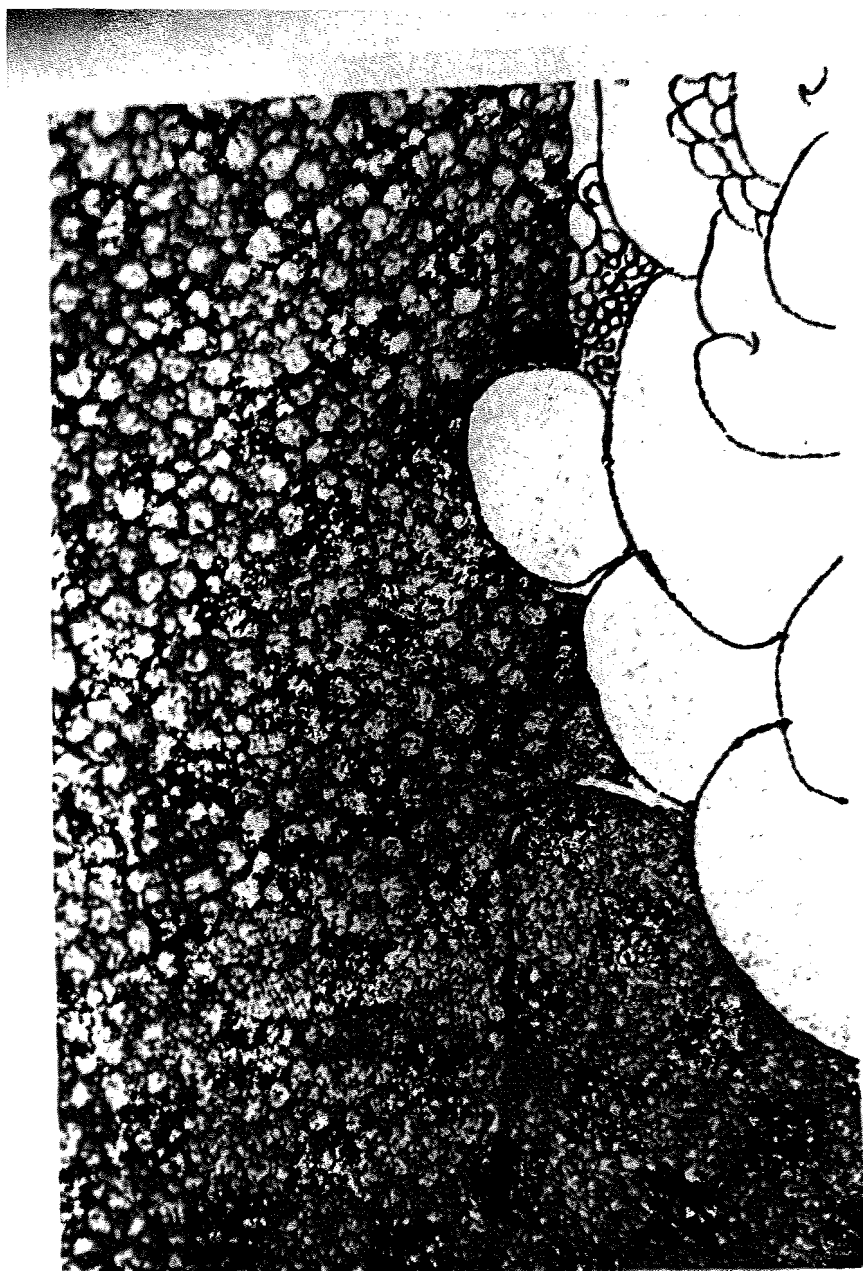


Figure 19-A. Area enlargement of Figure 19, "Confinement" containing aquatint, hard and soft-grounds, zinc, size 12" x 16".

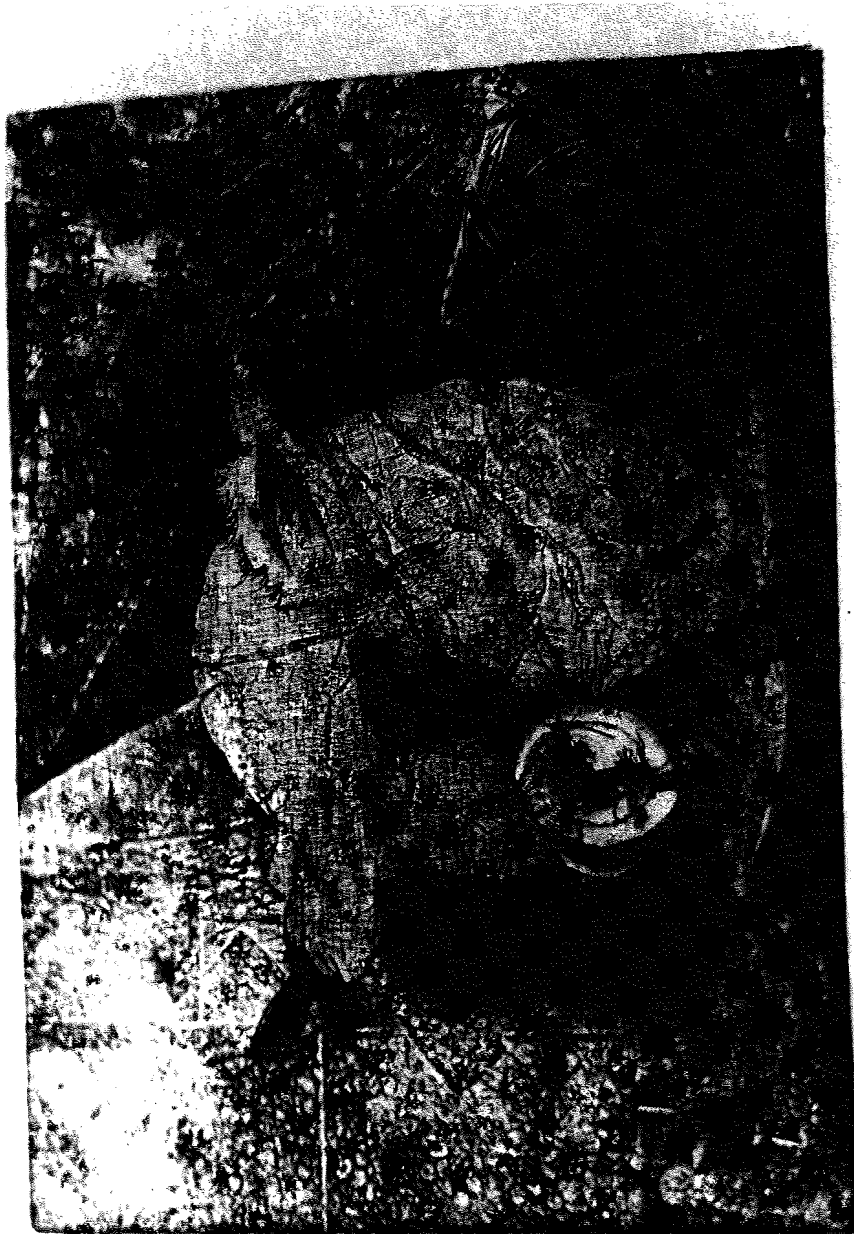


Figure 20. "Contentment" final thesis print using non-conventional materials containing lift-ground, aquatint, zinc, hard and soft-ground etching, size 12" x 16".

When comparing the three preliminary prints and the final thesis print using conventional materials (Figures 13, 14, 15, and 16) with the three preliminary and final thesis prints using non-conventional materials (Figures 17, 18, 19, and 20), few, if any, significant differences are apparent. This observation proves that expandable materials, which demand far less time and effort on the part of the artist, can produce equally satisfactory results.



## CHAPTER V

### CONCLUSION

The problem set forth in this comparative study explored the characteristics of expandable acid-resistant materials, also referred to as non-conventional materials, in the intaglio printmaking processes.

The procedure for the creative project is based on contrasts and comparisons between conventional and non-conventional materials, using a variety of intaglio processes. Research was carried out through a series of controlled experiments. These were conducted on a progressive basis, beginning with the conventional materials and continuing through to the discovery of new, non-conventional products. The writer used three conventional products: shellac, rosin, and lift-ground solutions, and three non-conventional products: spray gum rubber, polyvinyl, and workable fixative. The first experiments with expandable acid-resistant materials were made with small copper and zinc plates, applying the following intaglio printing processes: hard-ground (etching), soft-ground (texture), aquatint, and lift-ground.

The test plates resulting from these experiments indicated the advantages of expandable acid-resistant

products over conventional materials. The writer then proceeded with further experimentation, combining the results into six preliminary and two final thesis prints, proving that non-conventional products have many valuable uses in intaglio printmaking.

The writer found that in hard and soft-ground processes workable fixative could be substituted for shellac as a stopout.

It was further determined that in the aquatint process spray gum rubber and workable fixative could be substituted for rosin.

Polyvinyl could be substituted for the conventional lift-ground solutions in the lift-ground process.

It was found that expandability proved to be the most important discovery of the non-conventional materials. This innovation led to additional disclosures of the conventional means presented in the comparative study. The writer's artistic expression was not hampered by dependence on available conventional methods and materials. Expandable acid-resistant materials allowed the writer to employ very simple, direct methods, or very complex and sophisticated techniques.

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